

## **Requirement for the added flexibility for EP long-pulse operation – A report to the OLUG Users Executive Committee**

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### **Introduction**

At the 2010 OLUG Workshop, with input from the user community, the OLUG recommended that all ports (i.e., 48°-cone-angle ports in addition to the currently operational 23°-cone-angle ports) originally earmarked for long-pulse operation be brought into facility capability. Optional irradiation of one or more beams from the opposite side (for example, opposite to the EP Backlighter beam) is also preferred by some users.

LLE's response to the 2010 OLUG recommendation is negative to the 48°-cone-angle ports option due to extremely high cost and the significant facility time that will take to implement. LLE response to the opposite side option is positive as this alternative will be at a relatively smaller scale with potential higher-payoff compared to the 48°-cone-angle ports operation.

### **Findings from the community survey**

Before the 2011 OLUG Workshop, we followed up with this thread and did a community-wide survey asking for PIs and users input for their preference on the additional long pulse operational legs to facilitate their HEDP experimental design and effectiveness. Several groups responded to the survey and the community's needs for the opposite side UV beam operation is high, from both LLE internal PIs and external PIs from national labs, academic and private sectors. The finding is highlighted below:

- Opposing UV beams will allow, with good diagnostics access, to study fast electron source and transport in preassembled warm high density plasmas created by high energy long pulse laser driven shock compression and heating of low density foams and solid targets, which is extremely important for fast ignition (Fast ignition consortium team).
- One opposing UV beam will facilitate characterization of the hydro experiments (3 UV beams, 15 – 20 kJ, 10 ns as the driver) by illuminating the backlight source foil from the front (PI - V. Smaylyuk)
- One opposing UV beam will enable detailed study of LTE and non-LTE plasmas via creation of such plasmas by exploding foil (or heating foam samples) from both sides, with excellent diagnostics access (both face-on and side-on probe) (PIs – B. Heeter, D. Froula)
- Opposing UV beam will also assist the study of collisionless shock and the associated magnetic field for astrophysics (PI – H.-S. Park)

In addition, the community requests all four ns UV beams be brought to their full energy performance as well as the 100 ps pulse with 100 J/beam operation. There is also demand on the 4 $\omega$  Thomson Scattering probe beam.

### **Follow-up feedback from LLE**

A feasibility study has been conducted to establish the potential UV-beam routing to the opposite side of the target chamber from the existing 23°-cone-angle ports. LLE is considering OLUG's recommendation and planning to implement it in FY13, likely bringing B4 to the backside of the chamber and directly opposite to B3. The project requires significant resources and long lead time (about 1 year from start to finish). The material cost will be around \$300K. This item will be presented in LLE's FY13-17 Cooperative Agreement Research Proposal to NNSA.

LLE continues to work to bring the UV beams to their full capability. The 100 ps, 100J/beam capability will be available in Q4 FY11.